

Table 1: Acreage of wetland resources by county identified from the National Wetland Inventory maps during 1980-1987

WETLAND HABITATS								Total Wetland Habitats	DEEP WATER HABITATS			
COUNTY	Scrub- shrub	Forested	Wet meadow	Shallow Marsh	Deep marsh	Open Water	Other **		Limnetic lake	Perennial riverine	Deep Water	Total
Adams	103	1,913	121	128	21	451		2,737	199	185	384	3,121
Allen	317	8,082	666	786	177	1,540	694	12,262	921	1,233	2,154	14,416
Bartholomew	486	10,436	188	128	21	1,316	80	12,654	877	750	1,627	14,281
Benton	80	467	474	312	19	123	1	1,475		114	114	1,589
Blackford	54	1,433	317	274	61	342		2,480		9	9	2,489
Boone	143	3,460	610	195	25	552	1	4,985	128	201	329	5,314
Brown	58	2,132	177	72	75	1,546	939	4,999	1,513	25	1,538	6,538
Carroll	322	4,085	928	380	40	355	154	6,264	574	1,784	2,358	8,622
Cass	395	4,600	1,460	957	145	436		7,993	210	1,435	1,644	9,637
Clark	112	3,377	153	98	16	1,315	11	5,082	1,459	136	1,594	6,676
Clay	78	4,657	239	183	21	3,260	16	8,453	337	622	958	9,412
Clinton	256	4,591	677	196	44	342		6,106	80	119	199	6,305
Crawford	50	654	11	56	38	485	9	1,303	2,505	167	2,672	3,975
Daviess	235	8,866	424	324	42	1,658	160	11,709	2,153	962	3,115	14,824
Dearborn	171	1,859	244	71	19	1,214	70	3,649	1,024	512	1,536	5,185
Decatur	48	2,494	68	27	16	683	9	3,345	361	19	380	3,724
Dekalb	455	6,710	1,557	2,137	216	1,069	879	13,023	316	104	420	13,443
Delaware	185	3,709	310	553	98	803		5,657	1,259	431	1,690	7,347
Dubois	584	8,256	322	303	261	1,752		11,478	2,499	797	3,297	14,774
Elkhart	1,318	7,522	1,053	1,979	837	1,065	1,013	14,786	1,332	917	2,249	17,035
Fayette	43	1,823	33	8	7	247	47	2,208	22	236	258	2,466
Floyd	25	446	48	60	27	558	36	1,200	378	28	406	1,696
Fountain	412	7,300	383	508	84	462	66	9,214	133	1,333	1,465	10,679
Franklin	93	2,276	77	26	4	721	128	3,325	3,051	645	3,696	7,021
Fulton	944	4,982	2,012	2,685	579	694	95	11,990	1,427	438	1,865	13,855
Gibson	1,251	18,182	682	552	597	1,868	369	23,500	3,483	3,494	6,977	30,477
Grant	190	2,384	475	254	62	846		4,212	80	603	683	4,895
Greene	178	5,876	295	212	29	3,014	242	9,847	755	1,229	1,983	11,831
Hamilton	109	5,240	302	445	96	651	7	6,848	2,389	545	2,934	9,782

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Hancock	37	2,447	117	138	36	404	3	3,182	112	11	123	3,305
Harrison	106	1,389	39	177	74	1,502	40	3,328	3,050	355	3,405	6,733
Hendricks	23	1,793	63	46	20	782	37	2,763	151	9	160	2,923
Henry	104	2,446	274	239	56	603	2	3,723	601	2	603	4,326
Howard	154	4,065	360	353	22	261	7	5,222	586	220	806	6,028
Huntington	160	2,042	290	353	55	566	59	3,524	2,519	587	3,106	6,630
Jackson	477	21,015	605	404	25	1,409	158	24,093	593	1,369	1,962	26,055
Jasper	582	3,256	1,249	1,960	322	574	364	8,307	431	305	736	9,043
Jay	115	4,235	195	267	41	440		5,293				5,293
Jefferson	1,041	5,585	117	40	28	859	112	7,782	1,226	142	1,368	9,150
Jennings	656	5,132	167	54	19	1,256	103	7,386	462	337	798	8,184
Johnson	65	2,847	106	83	35	1,095	15	4,246	420	360	779	5,025
Knox	291	13,512	928	942	74	1,947	125	17,818	790	3,418	4,208	22,026
Kosciusko	3,104	11,332	3,042	3,706	1,942	1,350	2,706	27,172	10,574	261	10,835	38,007
LaGrange	2,704	11,356	2,660	4,684	1,224	1,090	1,988	25,708	4,286	245	4,532	30,239
Lake	1,408	5,856	1,618	5,052	2,477	2,578	772	19,760	2,584	793	3,377	23,137
LaPorte	1,648	13,402	2,872	3,147	1,775	1,849	690	25,383	2,028	241	2,269	27,652
Lawrence	59	3,166	265	219	14	857	6	4,587	1,101	729	1,830	6,417
Madison	225	5,155	472	393	73	696		7,014	158	289	447	7,461
Marion	55	1,622	74	151	11	1,629	18	3,560	3,899	976	4,875	8,435
Marshall	574	10,598	1,732	3,246	559	1,166	166	18,039	2,998	194	3,192	21,231
Martin	72	3,904	137	161	49	558		4,882	969	1,481	2,450	7,332
Miami	192	2,729	567	713	53	417	100	4,771	454	910	1,364	6,135
Monroe	132	2,225	55	172	56	670	11	3,323	10,982	111	11,093	14,416
Montgomery	292	4,417	764	407	21	323	32	6,255	428	526	953	7,209
Morgan	116	4,606	465	368	22	2,085	172	7,832	610	1,249	1,859	9,691
Newton	484	4,807	682	1,093	716	646	538	8,965	28	462	491	9,456
Noble	3,651	11,389	2,109	4,829	776	1,359	3,354	27,467	3,723	103	3,827	31,294
Ohio	8,153	153	72	66		305	30	633	1,021	206	1,227	1,860
Orange	129	1,284	129	416	59	617	237	2,871	4,519		4,519	7,389
Owen	143	3,709	450	136	15	1,936	113	6,501	1,010	897	1,906	8,408
Parke	196	4,205	164	139	5	762	98	5,568	2,524	756	3,279	8,848
Perry	147	1,361	48	88	28	742		2,414	4,472	121	4,594	7,007

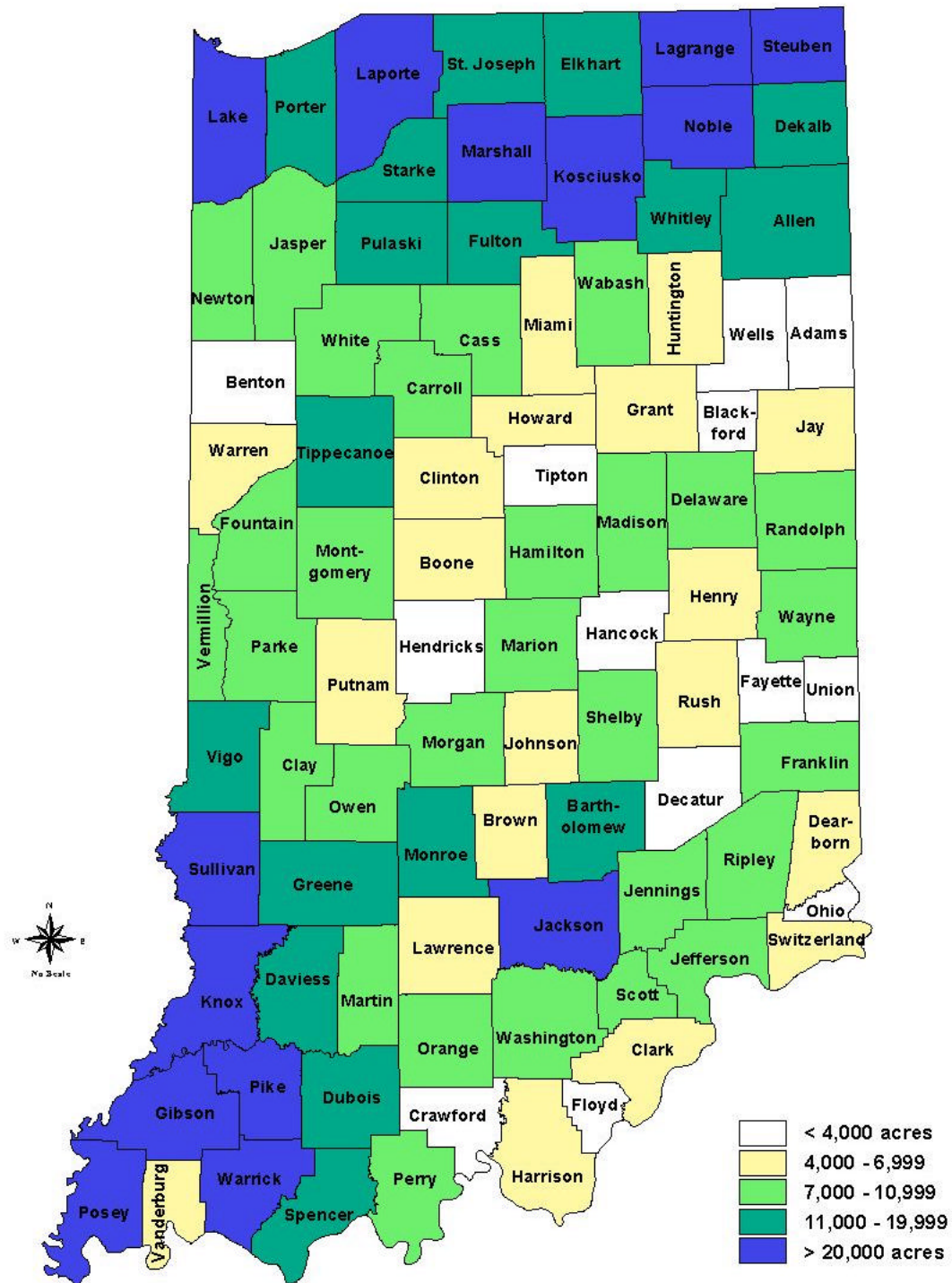
WETLAND HABITATS								Total Wetland Habitats	DEEP WATER HABITATS			
COUNTY	Scrub- shrub	Forested	Wet meadow	Shallow Marsh	Deep marsh	Open Water	Other **		Limnetic lake	Perennial riverine	Deep Water	Total
Pike	1,693	13,362	446	541	421	3,915	130	20,510	721	1,717	2,438	22,948
Porter	1,414	9,791	1,034	2,519	1,365	1,445	532	18,100	672	285	956	19,056
Posey	966	16,155	465	232	88	1,181	950	20,036	3,014	2,965	5,979	26,015
Pulaski	374	7,241	2,204	1,383	123	335	65	11,725	40	827	867	12,592
Putnam	83	3,058	48	68	7	1,025	77	4,366	1,209	171	1,380	5,746
Randolph	125	5,996	264	122	23	428	4	6,962	74	28	102	7,063
Ripley	795	4,416	51	19	16	1,507	35	6,839	783	225	1,008	7,846
Rush	172	4,639	217	91	12	343	3	5,476	69	22	91	5,566
St. Joseph	577	6,279	1,064	1,139	747	925	219	1,095	1,502	264	1,766	12,716
Scott	221	5,673	99	121	5	1,121	276	7,515	953	62	1,016	8,530
Shelby	90	5,822	196	133	18	400	28	6,686	190	391	581	7,267
Spencer	396	7,845	350	188	29	1,993	27	10,829	1,398	260	1,657	12,486
Starke	312	7,940	1,187	1,312	254	414		11,419	1,847	185	2,032	13,450
Steuben	1,928	7,051	2,433	5,058	1,901	2,088	1,394	21,851	7,411	7	7,418	29,269
Sullivan	403	14,175	452	374	127	2,862	73	18,466	3,959	514	4,474	22,940
Switzerland	74	838	45	44	1	687	23	1,712	2,467	1	2,469	4,180
Tippecanoe	300	7,521	1,317	902	220	471	150	10,880	91	2,211	2,301	13,181
Tipton	96	3,103	201	144	9	103		3,656		1	1	3,657
Union	106	1,408	54	41	8	132	201	1,951	2,015	9	2,024	3,975
Vanderburgh	121	2,650	110	145	8	1,319	38	4,391	1,250	93	1,344	5,735
Vermillion	129	3,909	205	225	53	847	105	5,473	367	2,109	2,476	7,949
Vigo	233	11,902	228	358	25	2,406	25	15,176	1,397	1,797	3,194	18,369
Wabash	492	2,224	1,133	465	59	685	771	5,829	3,549	859	4,408	10,237
Warren	99	3,891	359	503	95	247	245	5,439	29	735	764	6,203
Warrick	1,522	11,618	364	417	433	5,473	130	19,957	2,780	192	2,972	22,929
Washington	140	5,999	192	194	20	1,086	8	7,639	500	415	915	8,554
Wayne	218	5,717	166	107	38	676	39	6,961	282	51	334	7,295
Wells	40	2,083	169	189	83	538		3,102	37	390	428	3,530
White	539	2,270	2,265	1,057	35	344	536	7,046	1,779	64	1,842	8,889
Whitley	634	4,923	561	1,328	158	870	1,465	9,939	1,376	42	1,418	11,357
TOTAL	42,131	504,336	55,071	67,564	20,730	98,565	24,633	813,032	140,532	53,630	194,162	1,007,194

NWI habitat types were combined based on a scheme developed by the Illinois Natural History Survey.

** Includes palustrine emergent with undetermined water regime, littorial lake, and riverine unconsolidated shore.

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Indiana Wetland Density by County



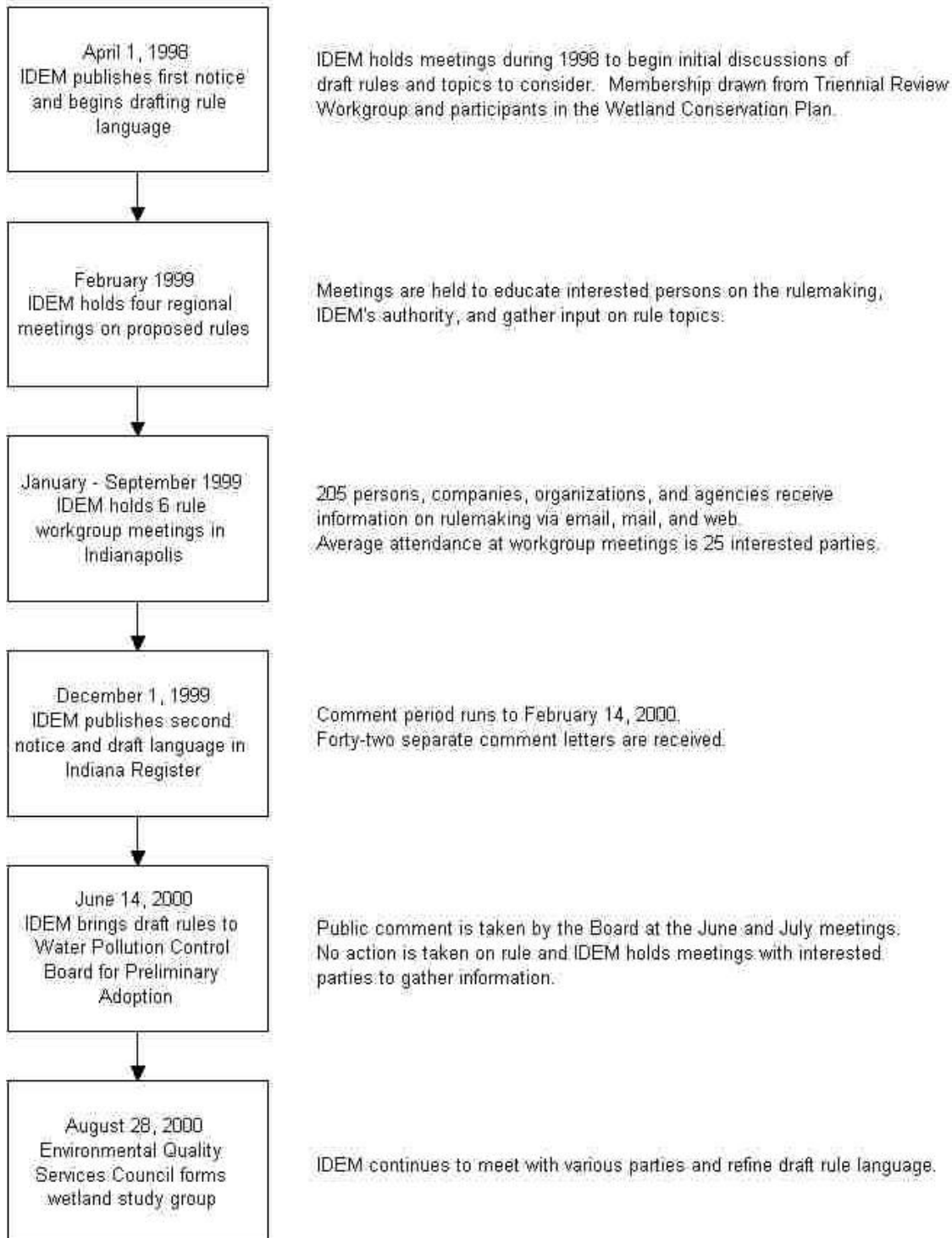
Map made by Shelley Liu IDNR - MIS Dec 15, 1995.
 Updated graphics by Joanna Wood IDEM - OWM Dec 3, 1998.

Indiana Wetland Density by County



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Wetland Water Quality Standards and Section 401 Water Quality Certification Procedures Rulemaking Timeline



WHAT ARE WETLANDS?

Swamps, marshes, bogs, fens, sloughs, and bottomlands - we have many names for wetlands, but what makes a wetland a wetland? A single, comprehensive, universally accepted definition does not exist which concisely and accurately defines all wetlands. Because wetlands have diverse mixes of vegetation, from tidal marshes on the Atlantic and Pacific Coasts to bottomland hardwood forests along the Patoka River, varying degrees of water, from cypress swamps in Posey County to wet prairie in Lake County, and exist in many parts of the landscape, such as isolated pothole wetlands in Steuben County to backwater wetlands along the Wabash River, one definition could not possibly fit all wetlands.

Regardless, all wetlands do have some common traits, which help answer the question - what is a wetland. In general, wetlands are areas where water covers the soil, or is present either at or near the surface of the soil for part or all of the year, including the growing season for plants. Wetlands are in-between places, which lie between deep water in lakes and streams and dry land. Wetlands support an array of plants and animals which have adapted to life in saturated or flooded conditions. Wetlands have soils that differ from soils in dry areas, exhibiting characteristics that show the soil developed in saturated conditions. Wetlands can be identified by these basic indicators: vegetation, hydrology and soils. All three characteristics must be present during some portion of the growing season for an area to be a jurisdictional wetland - a wetland protected by the Clean Water Act.

For the purpose of regulation under the Clean Water Act, the U.S. Army Corps of Engineers (Corps), the U.S. Environmental Protection Agency, and the Indiana Department of Environmental Management define wetlands as:

Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Listed below are descriptions of these indicators, which further explain the definition of wetlands.

Vegetation indicators:

In the United States, near 5,000 different plants may live in wetlands. These plants, known as hydrophytic vegetation, are listed in regional publications of the U.S. Fish and Wildlife Service. For example, cattails, bulrushes, sphagnum moss, bald cypress, willows, sedges, rushes, arrowheads and lily pads usually occur in wetlands. Plants that grow in wetlands also exhibit certain physical qualities, such as shallow root systems, swollen trunks, or roots found growing from the plant stem or trunk above the soil surface.

Soil indicators:

Approximately 2,000 named soils in the United States occur in wetlands. Such soils, called hydric soils, have characteristics that show they developed in conditions where the presence of water has limited soil oxygen for long periods during the growing season. If the Natural Resources Conservation Service (NRCS) has listed the soil in your area as hydric, the area

might be a wetland. Hydric soil indicators include:

1. Soil consists predominantly of decomposed plant material (peats or mucks).
2. Soil has a thick layer of decomposing plant material on the surface.
3. Soil has a bluish gray or gray color below the surface, or the major color of the soil at this depth is dark (brownish black or black) and dull.
4. Soil has the odor of rotten eggs.
5. Soil is sandy and has a layer of decomposing plant material at the soil surface.
6. Soil is sandy and has dark stains or dark streaks of organic material in the upper layer below the soil surface.

Hydrology indicators:

Some wetlands are hard to recognize because they are dry during part of the year. Wetland hydrology refers to the presence of water at or above the soil surface for a sufficient period of the year to significantly influence the plant types and soils that occur in the area. Although the most reliable evidence of wetland hydrology may be provided by gauging station or groundwater well data, such information is limited for most areas and, when available, requires analysis by trained individuals. Thus, we observe most hydrologic indicators during field inspection. Most do not reveal either the frequency, timing, or duration of flooding or the soils saturation. However, the following indicators provide some evidence of the periodic presence of flooding or soil saturation:

1. Standing or flowing water is observed on the area during the growing season.
2. Soil is waterlogged during the growing season.
3. Water marks are present on trees or other erect objects. Such marks show that water periodically covers the area to the depth shown on the objects.
4. Drift lines, which are small piles of debris oriented in the direction of water movement through an area, are present. These often occur along contours and represent the approximate extent of flooding in an area.
5. Thin layers of sediments are deposited on leaves or other objects.

INDIANA'S WETLAND RESOURCES

Wetlands occur in and provide benefits to every county in Indiana. The lack of quantitative information on some aspects of Indiana's wetland resources is a major obstacle to improving wetland conservation efforts.

The most extensive database on wetland resources in Indiana is the National Wetlands Inventory developed by the U.S. Fish & Wildlife Service. In 1985, the Indiana Department of Natural Resources, Division of Fish and Wildlife entered into a cooperative agreement with the U.S. Fish and Wildlife Service to share the costs of mapping Indiana's wetlands. Indiana's National Wetlands Inventory maps were produced primarily from interpretation of high-altitude color infrared aerial photographs (scale of 1:58,000) taken of Indiana during spring and fall 1980-87. Map production also included field investigations, reviews of existing information, quality assurance, draft map production, interagency review of draft maps, and final map production. National Wetland Inventory maps indicate wetlands by type, using the Cowardin et al. classification scheme (1979, Classification of wetland and deepwater habitats of the United States, U.S. Fish and Wildlife Service FWS/OBS-79/31). The minimum size of a given wetland on National Wetland Inventory maps is typically one to three acres. Very narrow wetlands in river corridors and wetlands under cultivation at the time of mapping are generally not depicted, and forested wetlands are poorly discriminated.

The most recent and complete analysis of this database was conducted in 1991 by the Indiana Department of Natural Resources. This report, prepared by Robert Rolley, Wildlife Research Biologist, is entitled "Wildlife Management and Research Notes, #532, Indiana's Wetland Inventory." According to the report, Indiana had approximately 813,000 acres of wetland habitat in the mid-1980s when the data were collected. Wetland loss or gain since then is unknown. The following figures are from the Indiana Department of Natural Resources report:

Chart 1: Wetland acreage estimates for Indiana during the 1980's by wetland type

WETLAND HABITATS	ACRES	% OF TOTAL
Scrub-shrub	42,131	5.2%
Forested	504,336	62.0%
Wet Meadow	55,071	6.8%
Shallow Marsh	67,564	8.3%
Deep Marsh	20,730	2.5%
Open Water	98,565	12.1%
Other	24,633	3.0%
Total wetland habitats	813,032	100%

Palustrine wetlands were also classified according to the overall water regime.

Chart 2: Classification of wetlands by prevalent hydrology

WATER REGIME	ACRES	% OF TOTAL
Temporarily Flooded	460,000	57%
Seasonally Flooded	220,000	27%
Intermittently Exposed	80,000	10%
Semi-permanently Flooded	40,000	5%
Saturated	24,000	3%

The IDNR project confirmed that the major concentration of wetlands was in the northeastern portion of Indiana, along river floodplains in southwestern Indiana, and in the Lake Michigan shoreline region in northwestern Indiana. Noble County contained the greatest number of wetland acres with approximately 27,500 acres or 3.38% of the state=s total wetland acreage. Ohio County contained the least amount of wetland area with 633 acres or only 0.08% of the states total wetland acreage. Forested wetlands were the most common type of wetland in all 92 counties.

The best estimate of the wetlands in Indiana before settlement 200 years ago is an assessment based on hydric soils (soils indicative of wetlands) conducted by the USDA Soil Conservation Service (now the Natural Resource Conservation Service). Based on an analysis of this data by the Indiana Department of Natural Resources, there were approximately 5.6 million acres of wetlands in Indiana 200 years ago. Combining the information from the National Wetlands Inventory and the IDNR yields the following summary:

Estimated wetlands circa 1780s:	5,600,000 acres
Percent of surface area in wetlands circa 1780s	24.1%
Existing wetlands	813,000 acres
Percent of surface area in wetlands today	3.5 %
Percent of wetlands lost	85%

The Department of Environmental Management received a grant from USEPA in1999 to investigate trends in wetlands losses and gains. Part of this study will focus on regulatory activities, another part on conservation efforts, and a final part devoted to recreating the work carried out by IDNR in the 1980's utilizing more recent information and newer habitat studies.